

WHAT IS CLAIMED IS:

1                   1.     A method for extracting information in an optical subcarrier of a  
2 subcarrier multiplexed baseband optical signal, the subcarrier multiplexed baseband optical  
3 signal comprising a modulated optical carrier for a payload and a modulated optical  
4 subcarrier for control information, the modulated optical subcarrier being at a subcarrier  
5 frequency which is separated from the modulation bandwidth of the optical carrier, the  
6 method comprising:

7                   receiving the subcarrier multiplexed baseband optical signal at an input port of  
8 an optical circulator;

9                   applying the subcarrier multiplexed baseband optical signal via an extraction  
10 port of the optical circulator to a fiber Bragg grating;

11                   optically separating the modulated optical subcarrier in the fiber Bragg grating  
12 and directing the modulated optical subcarrier to an optical energy transducer while reflecting  
13 the modulated optical carrier back to the extraction port of the optical circulator; and

14                   outputting the modulated optical carrier to an output port of the optical  
15 circulator.

16                   2.     The method according to claim 1 further comprising:

17                   outputting a modulated electrical signal from the optical transducer which is  
18 proportional to modulation of the modulated optical signal; and

19                   detecting the information modulating the electrical signal.

20                   3.     A method for swapping control information of a subcarrier multiplexed  
21 baseband optical signal, the subcarrier multiplexed baseband optical signal comprising a  
22 modulated optical carrier for a payload and a modulated optical subcarrier for control  
23 information, the modulated optical subcarrier being at a subcarrier frequency which is  
24 separated from the modulation bandwidth of the optical carrier, the method comprising:

25                   separating the modulated optical carrier from the modulated optical subcarrier  
26 according to the method of claim 1; and

27                   applying the modulated optical carrier to an optical modulator adapted for  
28 writing new subcarrier modulated control information.

29                   4.     A method for controlling the propagation path of a subcarrier  
30 multiplexed baseband optical signal comprising a modulated optical carrier for a payload and

3 a modulated optical subcarrier for control information, the modulated optical subcarrier being  
4 at a subcarrier frequency which is separated from the modulation bandwidth of the optical  
5 carrier, the method comprising:

6 receiving the signal at the input to a routing element;  
7 extracting the modulated optical subcarrier control information  
8 according to the method of claim 2;  
9 changing the wavelength of the optical carrier for the payload in  
10 response to the control information; and  
11 directing the optical carrier for the payload along one of a plurality of  
12 output paths from the routing element responsive to the control information.

5. The method according to claim 4 further comprising the step of  
modulating the directed optical carrier to add a subcarrier containing new control  
information.

6. A device for extracting information in an optical subcarrier of a  
subcarrier multiplexed baseband optical signal, the subcarrier multiplexed baseband optical  
signal comprising a modulated optical carrier for a payload and a modulated optical  
subcarrier for control information, the modulated optical subcarrier being at a subcarrier  
frequency which is separated from the modulation bandwidth of the optical carrier, the device  
comprising:

7 an optical circulator having an input port for receiving the subcarrier  
8 multiplexed baseband optical signal, a bi-directional extraction port and an output port;  
9 a fiber Bragg grating optically coupled to said extraction port of said optical  
10 circulator for optically separating the modulated optical subcarrier from the subcarrier  
11 multiplexed baseband optical signal and reflecting the modulated optical carrier to the optical  
12 circulator; and  
13 an optical energy transducer optically coupled to receive the modulated optical  
14 subcarrier.

7. The device according to claim 3 wherein the optical energy transducer  
is a photodetector for generating a electrical signal proportional to the signal of the modulated  
subcarrier and further including:

a detector for detecting the information modulating the electrical signal.

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1                   8.       A device for swapping control information of a subcarrier multiplexed  
2 baseband optical signal, the subcarrier multiplexed baseband optical signal comprising a  
3 modulated optical carrier for a payload and a modulated optical subcarrier for control  
4 information, the modulated optical subcarrier being at a subcarrier frequency which is  
5 separated from the modulation bandwidth of the optical carrier, the device comprising:  
6                   an optical subcarrier receiver according to claim 6 and a means for modulating  
7 the modulated optical carrier to add new information contained in a new modulated optical  
8 subcarrier.

1                   9.       An optical routing device adapted for controlling the wavelength and  
2 manner of propagation of a subcarrier multiplexed baseband optical signal, said subcarrier  
3 multiplexed baseband optical signal comprising a modulated optical carrier for a payload and  
4 a modulated optical subcarrier for control information, the modulated optical subcarrier being  
5 at a subcarrier frequency which is separated from the modulation bandwidth of the optical  
6 carrier, the routing element comprising:  
7                   an optical subcarrier receiver according to claim 7;  
8                   a controller for controlling other components in response to the control  
9 information extracted by said optical subcarrier receiver; and  
10                  a tunable optical source coupled to said controller, adapted for emitting an  
11 optical signal with a modulation proportional to the modulated optical carrier at a wavelength  
12 dictated by the control information on the said control information.

1                   10.      The device of claim 9 wherein the tunable optical source comprises:  
2                   a tunable laser optically coupled to a semiconductor optical amplifier.

1                   11.      The device of claim 9 further comprising a wavelength switch having  
2 at least one input and a plurality of outputs, the switch being optically coupled to the tunable  
3 optical source and adapted for directing an optical signal on any of its inputs to a specific  
4 output in accordance with the wavelength of the input signal.

1                   12.      The device of claim 11 wherein the wavelength switch is an array  
2 waveguide grating.

1                    13.     The device of claim 11 further comprising an array of optical  
2 modulators coupled to the outputs of the wavelength switch, said modulators adapted for  
3 further modulating the modulated optical carrier signal to add additional information.

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